International Honey Market

by NORBERTO GARCIA and RON PHIPPS

International Honey Market Report:

Food fraud expert "Dr. Roberts lit a candle"

Welcome

We want to welcome Dr. Kirsten Traynor as the new editor of the *American Bee Journal*. Kirsten's expertise, her love of beekeeping and her perception of the importance of healthy bee populations to overall agricultural production, coupled with her love of honey infused with scientific knowledge, will continue to advance the excellent work which Joe Graham had done for so long.

Kirsten's Chapter 22 in the *Hive and the Honey Bee* is very informative and bears deeply upon creating a positive agenda for honey marketing. Her book, *Two Million Blossoms,* is devoted to the analysis of the health benefits of honey. As we've written numerous times, there is a golden opportunity for honey if, and when, the industry markets honey in respect to the health halo which surrounds the product. Kirsten's scientific knowledge has the potential to play a prominent role in illuminating the health benefits of honey.

A Positive Agenda

The creative marketing of products is best assessed by a) increases in per capita consumption; b) increases in prices and remuneration for all segments of an industry, c) increases in the quality and diversity of the products, d) deeper awareness by consumers of the benefits and values within the given category of products; e) expanding applications of the products as a stand alone or an ingredient, and g) the absence of adulteration, fraud and safety concerns.

The wine, coffee and tea industries, as well as nutmeats like almonds, walnuts, etc., and natural fruits like blueberries and cranberries, have all achieved many of the above goals. It is because honey has not fully done this that the creation of a Positive Agenda has been called for by the international honey industry and far sighted leaders in the American honey and beekeeping industries. Chart 1 compares the consumption of various foods with imported and domestic honey.

At the recent World Honey Congress (Apimondia) held in October, there were many important initiatives, among which was the Roundtable on Economically Motivated Adulteration. Speakers at this meeting included Prof. Michael Roberts, representatives of the USDA, scientists from the European Commission, Prof. Norberto Garcia and Ron Phipps. The proceedings may be published and the lectures are available online.

In addition, at the initiative of members of the Apimondia Scientific Commission, a committee has been formed to create a positive agenda for the international honey market. The members of the committee include Etienne Bruneau, Dr. Stan Daberkow, Chris Hiatt, Vice President of the AHPA, Norberto Garcia and Ron. Norberto was elected President of the Scientific Commission and Ron was selected as Vice President. The development of a positive agenda for honey is dependent upon solving the problem of economically

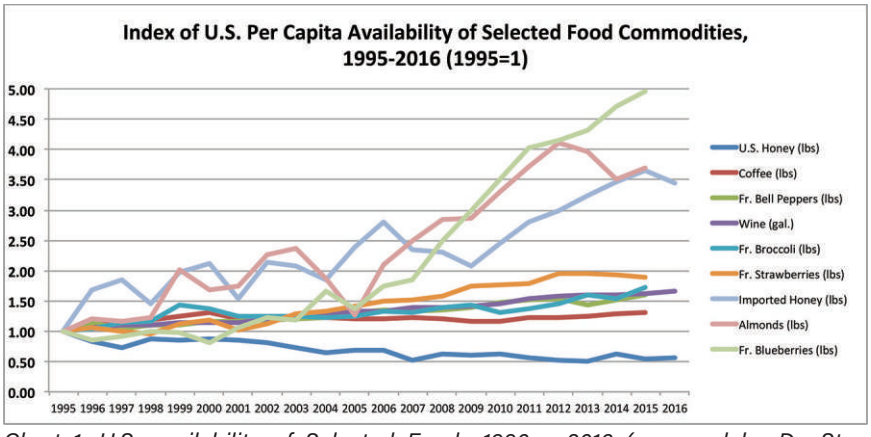

Chart 1. U.S. availability of Selected Foods 1990 – 2016 (prepared by Dr. Stan Daberkow)

motivated adulteration. The virtues of honey cannot be scientifically studied, convincingly communicated and creatively marketed unless the problem of economically motivated adulteration, which continues to plague the international industry, is cleared up.

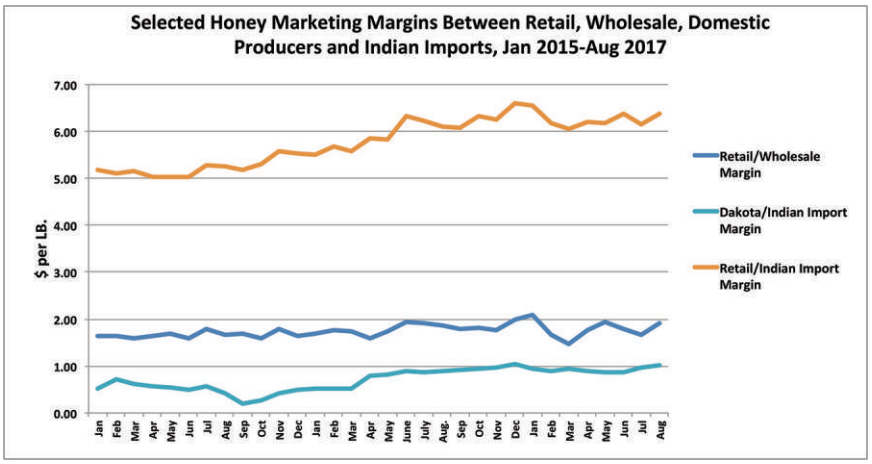

Chart 2: Retail vs. Raw Material Prices (prepared by Dr. Stan Daberkow)

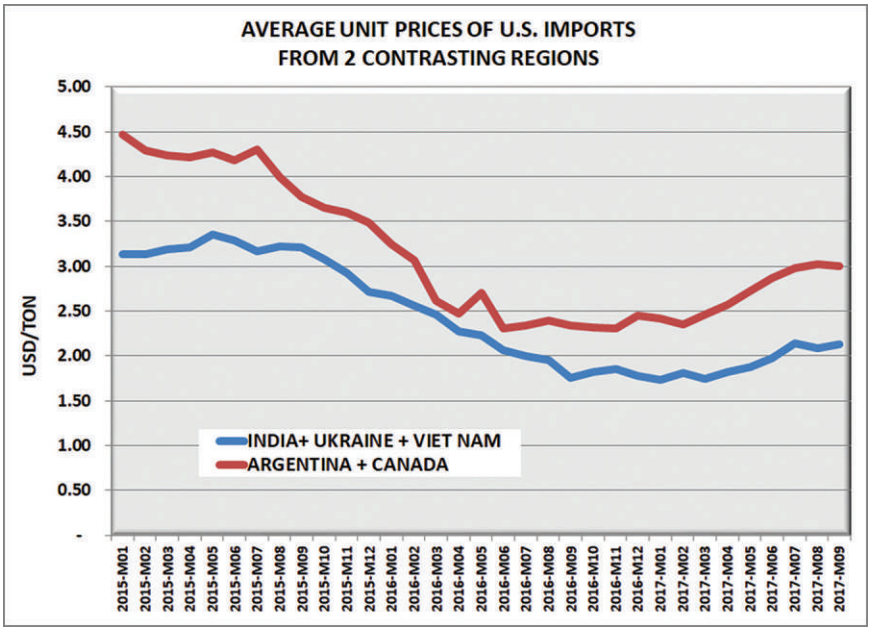

Chart 3: Average Prices US Imports (prepared by Dr. N. Garcia)

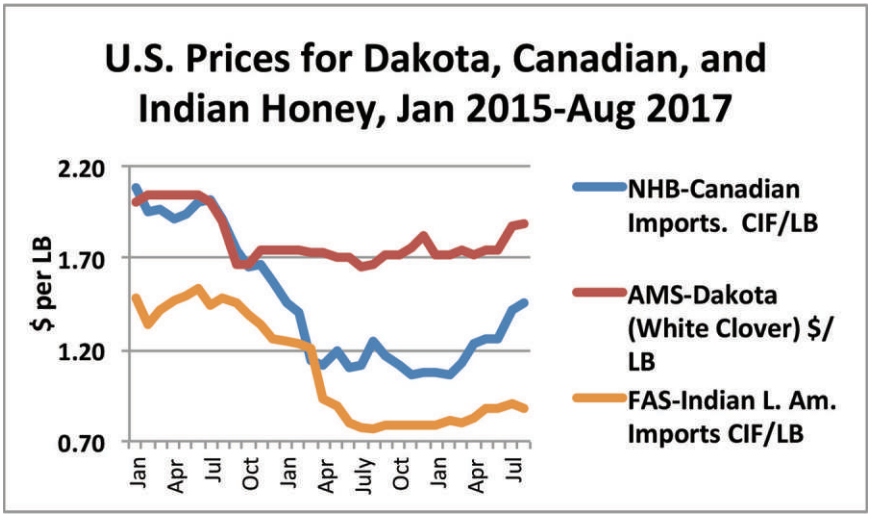

Chart 4: Selected honey marketing margins. (prepared by Dr. Stan Daberkow)

A Perfect Storm

Unfortunately the industry and beekeepers continue to face the threat of a perfect storm. The continued failure to integrate and balance the incentives to produce and consume honey, and the prevalence of circumvented and fake honey in the industry all jeopardize the ecological interests of the globe, global food security, and the well-being of the world's beekeepers.

There is a huge gap between the retail prices of honey and the plunging prices of raw material input. It is this gap which Dr. Daberkow has studied and documented, which elucidates the economics in economically motivated adulteration.

As this and other data within this report indicate, domestic honey prices are nearly $.50 to over $1.00/lb. higher than imported honey prices.

As this chart regarding marketing margins illustrates, since 2015 the margins between retail and wholesale prices have been about $2.00/lb. In contrast, the margin between domestic producer prices and Indian imports has increased over time and is currently about $1.00/lb. As Dr. Daberkow has pointed out, this illustrates, "the temptation for commercial honey buyers to gravitate towards this cheaper product. Finally the most obvious incentive for commercial honey marketers who import honey for the retail market, is the increasing market margin which grew from $5.00/lb. to over $6.00/lb. since early 2015."

We must note that there has been re-emergence of a two-tiered market where the domestic beekeepers are receiving prices that are two to two-and-a-half times greater than the prices received for equivalent honey from mature producing countries like Argentina and Canada, both of whom produce low moisture honey and enjoy wonderful floral sources for the production of white honey.

The three variable chart, which was published earlier, has attracted attention and comments from the

global industry. The contradiction among dramatic increases of total exports, stable numbers of beehives and decline of productivity per hive implies that there is a large quantity of fake honey plaguing the international market. This phenomenon of food fraud has become apparent to governments and trade associations throughout the world.

The only rational explanation for the above anomaly would be an enormous increase in productivity per hive in certain eastern countries. We know, however, that even in mature beekeeping industries, which have benefitted from financial resources devoted the beekeeping industry, there has been a steep erosion in productivity per hive. These declines in productivity have been clearly associated with environmental conditions, including the toxicity from large scale agribusiness, whose practices of chemical agriculture have harmed conditions in the soil, water and atmosphere and eliminated many diverse nectar sources through field wide herbicide applications. Such toxicity within the ecological systems has led to increased stress in the botanical life forms, which depend upon healthy ecological systems. The botanical sources associated with honey production have weakened from this climatic stress. Because of this, productivity in the major advanced countries has declined. Bret Adee, Dr. Pettis and other leaders who have studied these phenomena have pointed out how the complexities in these interacting ecological systems have led to the deterioration in productivity. While ecological stress is a global phenomenon, the reality is that the toxicity of soil, water and atmosphere in China and India has reached the highest levels of toxicity thus far observed in human history. This makes increases in productivity per hive in such stressed countries defy rational scientific explanation.

The deeper explanation most likely resides in the four modes of adulteration, which are 1) the introduction of extraneous sweeteners like rice and beet sugars, as it is harder to detect these C3 sugars (rice syrup can be purchased for about $.15/lb. and organic rice syrup for $.30/lb.); 2) extraction of unripe honey at a higher moisture content, which obviously increases total production and productivity per hive while reducing costs; 3) the use of resin technology which alters the quality of honey and can disguise country of origin; and 4) the blending of conventional honey with organic honey. As Prof. Garcia has pointed out, more sophisticated forms of rice syrup have been bio-chemically engineered to make their presence as an adulterant more difficult to detect. These 4 modes of adulteration are detectable directly or indirectly through several types of scientific analyses. The most effective of these modes is Nuclear Magnetic Resonance (NMR), described in detail in this issue of ABJ. Recently NMR has been able to detect country of origin for eucalyptus honey from Brazil, Uruguay and northern Argentina and served as a clue for discerning the blending of conventional honey with organic honey.

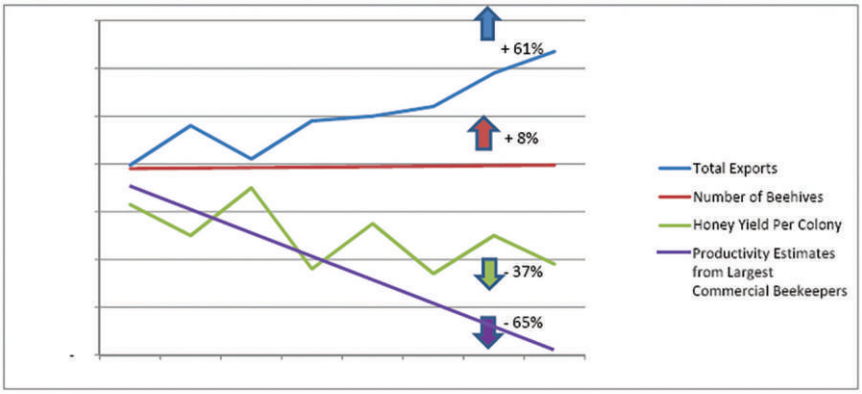

Chart 5: *Global Honey Exports, Beehives and Productivity per Hive.* Sources: Prof. Norberto Garcia, Richard Adee

Nuclear Magnetic Resonance (NMR) Testing

Some members of the industry have consistently disparaged NMR, claiming it is not sophisticated and has an inadequate database leading to inconsistent results. The use of NMR, along with other advanced scientific technologies, is crucial to combat economically motivated adulteration. The use of NMR by retailers, packers and importers in Europe quickly created a two-tiered market for Chinese honey;

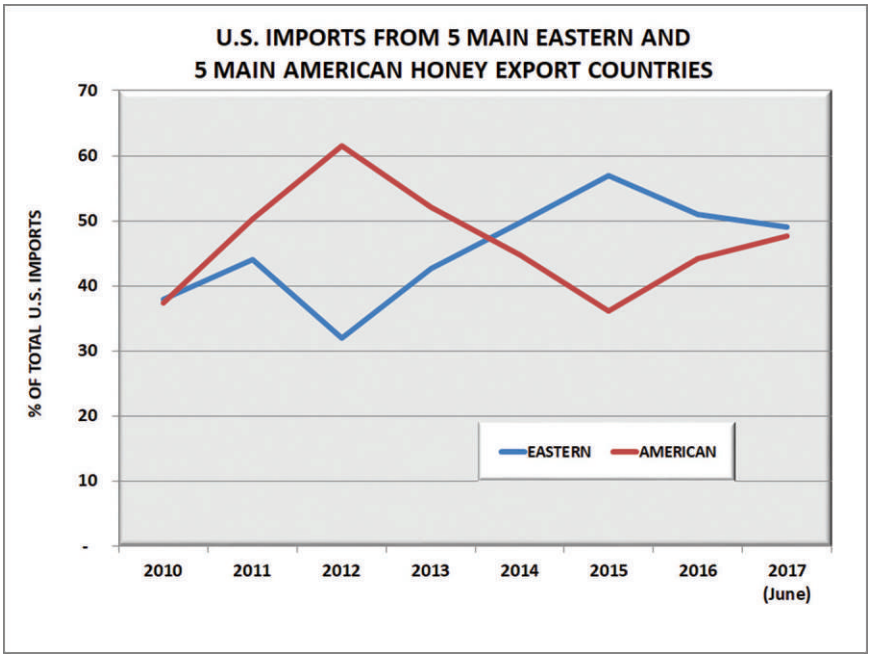

Chart 6: Growth of Eastern, Decline of South American Norberto

Chinese honey that could pass NMR was smaller in quantity and higher in price than Chinese honey that failed to pass NMR.

It is much easier to evade the strictest traceability regimes compared to the ability to evade advanced scientific analysis. Yet at the same time, experience indicates that those who benefit from circumvention and adulteration will continue to pursue this path with all cunning and shrewdness to evade detection and adapt quickly to new testing technology.

All analytic techniques applied to honey are associated with significant statistical and scientific problems in obtaining consistent results, because as a natural product produced from a wide variety of nectar sources honey is very complex, heterogeneous and dynamic. The reality is that NMR is the most sophisticated scientific technique which can test for the presence and absence of 36 major components within honey, including country of origin constituents. Further, it has the biggest database of any scientific methodology applied to honey. White's carbon isotope test was based upon approximately 100 samples. The global database for NMR already has over 11,000 samples, the largest honey database ever assembled. It is very important to note that the development and application of NMR to analysis of honey is developing through the collaborative efforts among private, government and academic laboratories.

Those who have disparaged NMR aiming to delay its implementation are more concerned with the results of NMR, not its power and validity. NMR is one among several techniques which can be used in combination, but it is the most powerful of the tools for detecting adulteration in the 4 modes described above. This is why its use is gaining increasing international acceptance.

To overcome the perfect storm looming on the horizon it is necessary to overcome the serious problem of these 4 modes of adulteration which have been employed in very cunning and sophisticated ways. NMR, along with other techniques of analysis, will be most beneficial if and when its use is required from 1) exporters, 2) importers, 3) packers and 4) retailers and manufacturers.

The current two tiered market exists in part due to what was argued to be a "perfect storm" for launching a global antidumping petition. The two tiered market was perceived as a condition that would avert an antidumping petition. However, market manipulations which drive prices to abysmal levels, de-incentivizes international beekeepers, whose contributions are essential to filling the supply gap in the large American market. These market manipulations also invite the forms of adulteration described above, which ultimately threaten to destroy the image and perception of honey as a pure, natural and healthy product. The flirtation with this two tiered market is fraught with strategic peril to the American honey industry as a whole. The willingness of some Asian honey exporters to set fixed prices for a year for their honey, despite the vicissitudes of climate, currencies, global economics, supply/demand relations, marketing achievements, is surprising and contrasts with major beekeeping groups in South America, which closely monitor supply/demand relations day by day.

These 4 modes of adulteration which are cited are consistent with the Codex definition of raw honey, a substance to which nothing is added nor subtracted from raw honey. Honey is the natural by-product of the interaction of botanical and zoological life without human manipulation.

The evolution of circumvention to avoid anti-dumping duties included:

a) fraudulent Bills of Lading, Country of Origin, quality inspection documents, lab reports
b) the export of Inner Mongolian sunflower honey through Thailand and Chinese rapeseed honey through Malaysia, the Phillippines, etc.
c) the transshipment and export of ultra-filtered Chinese honey
d) the blending of dark amber Argentine honey with ultra-filtered honey
e) the mixing of extraneous pollens with doctored honey
f) the blending of inexpensive and plentiful C3 sugars made from rice and beet
g) the use of resin technology to avoid FDA rejection and US Customs detection of circumvention
h) the use of vacuum chambers to artificially process "unripe honey."

These have been evolving features of market manipulation and systems of fraud which led to Honeygate (the largest scheme of food fraud in U.S. history), the deferred prosecution, jail time, financial fines and the temporary or permanent suspension of participation in the honey industry. This evolution has also led to illicit fortunes and market domination.

Honey reference Database

Recommendations were made during Apimondia 2017 regarding collection of authentic European honey samples in a centralized honey reference database. Sugar syrups and bee feeding products would also be collected in the "Biobank." Harmonization of analytical methods and validation of emerging analytical methods is still needed. The EU's Joint Research Commission's study of commercial honey samples which were collected in previous years concluded that 14% of the samples tested as adulterated with extraneous sweeteners. Thorough traceability combined with chemical and physical profiles of blends of honey are part of the solution to food fraud in honey.

Resin Technology

Chinese manufacturers have lauded the use of resin technology for honey. Various exporters from different countries have publicly described the alleged benefits. One of the most insidious uses of resin technology is its ability to remove color, aromatic and flavor components of honey. The ability to transform darker honey into light and ELA honey and to remove offensive aromas and unpalatable tastes, resulting in a milder honey has led some to comment that "there is no

difference between Indian honey and Argentine and Canadian honey except price." All countries have floral sources that produce honeys with unpalatable flavors and aromas. But the transformation of such honey through resin technology is illegal if the endproduct is still called honey according to the FDA. As China's export of resin technology to various countries became widely known, the US FDA explicitly stated "resin technology applied to honey creates products which cannot be labeled as 'Honey'."

The resin technology process can be summarized as follows:

- Facilitates removal of antibiotics
- Dramatically reduces dark-colored honey into light
- Involves heating and adding water to 40% followed by reducing the water content to 18-19%
- The equipment is manufactured in China and used worldwide in countries like Vietnam, Thailand and India. It is mobile.

The resin technology process, by bringing honey moisture up to 40%, then reducing it to 18-19%, literally "launders" honey. The addition and subtraction of moisture is not permitted in the U.S. for a product legally described as honey. Reports indicate that this process has been used in China since 2011.

It is widely suspected by international honey experts that the resin technology widely used on honey within China and exported to other honey exporting countries has the fundamental purpose to create equivalences where equivalences do not naturally exist. These equivalences have created the illusion of a collapse of qualitative differences between Indian, Argentine, Canadian honey and other origins.

Dr. Roberts' Recommendations

In Dr. Roberts' presentation to the World Honey Congress and his report to the Honey Industry Task Force, many important points were made. Dr. Roberts is a Professor of Law and a world expert on Food Fraud who was commissioned by the U.S. honey industry to provide a report with recommendations to address the growing concerns about honey fraud.

Below are some excerpts from this important recommendation to the U.S. honey industry:

- Embrace and support NMR testing.
- Coordinate and facilitate the use of NMR testing with US Customs and Border Patrol (CBP)
- Petition the FDA to issue strategic import alerts
- Conduct vulnerability assessment on the honey supply line.
- Consider the litigation option
- Persuade supermarkets to adopt private standard regimes to ensure honey integrity

In Dr. Roberts' reports and presentations it is clear that food fraud is a growing and serious problem that threatens the integrity of the product and in the process destroys a level playing field. To create a level playing field for all those who want to play by the rules, Dr. Roberts' experience suggests that both the media and the legal system be utilized if, and when necessary. We should also strive to maximize the unity that can be achieved within the industry.

The general principle of integrating both top down and bottom up pressure is essential. Bottom up pressure arises when consumers compel large companies to recognize their social responsibility to avoid food fraud and adulteration in what they manufacture and sell. The power of bottom up pressure in the honey industry has at this time been most effectively asserted in continental Europe. Dr. Roberts recommends coordination with international agencies responsible for oversight of food fraud.

In 2017, through the initiative of several U.S companies, bottom up pressure started to be felt. We anticipate that this pressure will grow dramatically.

In an October, 2017, segment of the television program "60 Minutes," the problem of fake wine was investigated. It was discovered that rare wines were being faked by mixing ordinary wines in an apartment kitchen, and forging exquisite labels. Historic "Thomas Jefferson" bottles of wine were sold to collectors for $100,000 each, but museum investigators did not turn up records of any such product made at Monticello. Fake whisky has also been uncovered according to recent television reports. Food fraud is a generic problem, and in some analyses honey sadly occupies a prominent position.

One lights a lamp, not to put a bushel over it, but to illuminate that which otherwise would be obscured.

Statistics and the Current Market

During the past 3 years, there has been a steady erosion of the already low prices from Ukraine, Thailand and Vietnam. Concurrently, there has been a steep erosion of prices from India and Argentina. Shockingly, the prices of Argentine honey have reached levels closer to prices from Thailand, Ukraine, Vietnam and India, despite the very favorable floral sources and mature beekeeping practices. An erosion in prices has also occurred for the high quality honey from Canada.

Argentina

The carryover from 2016-2017 is small and normal. Domestic beekeepers report that beehives are in good condition, and are looking for warmer temperatures as so far they are low for this time of year. Prospects are for a normal crop. Argentine honey prices are stable and firm, matching with European price ideas but not American price targets. Interest is mainly from Europe, including Germany, and Japan, and lagging from the U.S.

Brazil

Reports from Brazil indicate that the carryover of the last crop is small. Brazil's main honey export to the U.S. is organic honey. Through the first half of 2017 the prices of organic honey attained historic highs and export volumes increased about 12% over the same period in 2016. At the same time the price of conventional honey throughout the world collapsed. Prices for conventional honey went from the apex to the nadir. This

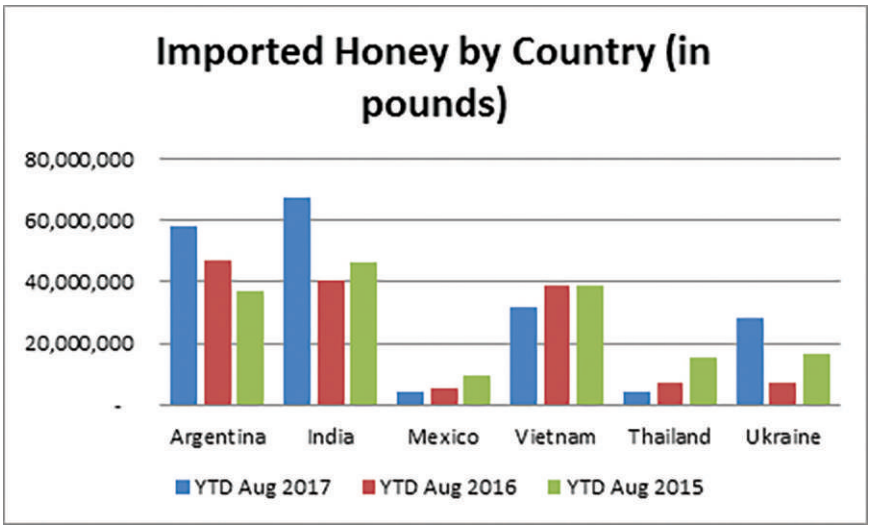

Chart 7: *Imported Honey by country* (from US Census Bureau statistics)

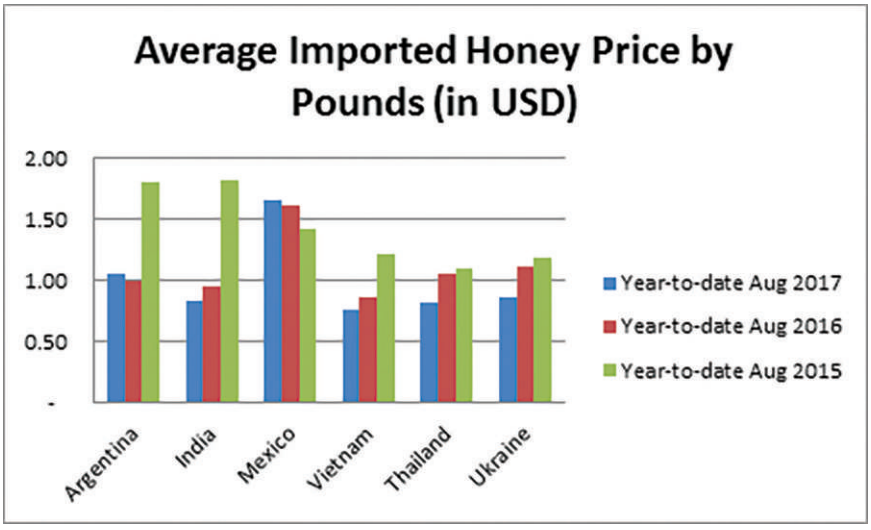

Chart 8: *Average Imported Honey Price per pound* (from US Census Bureau statistics)

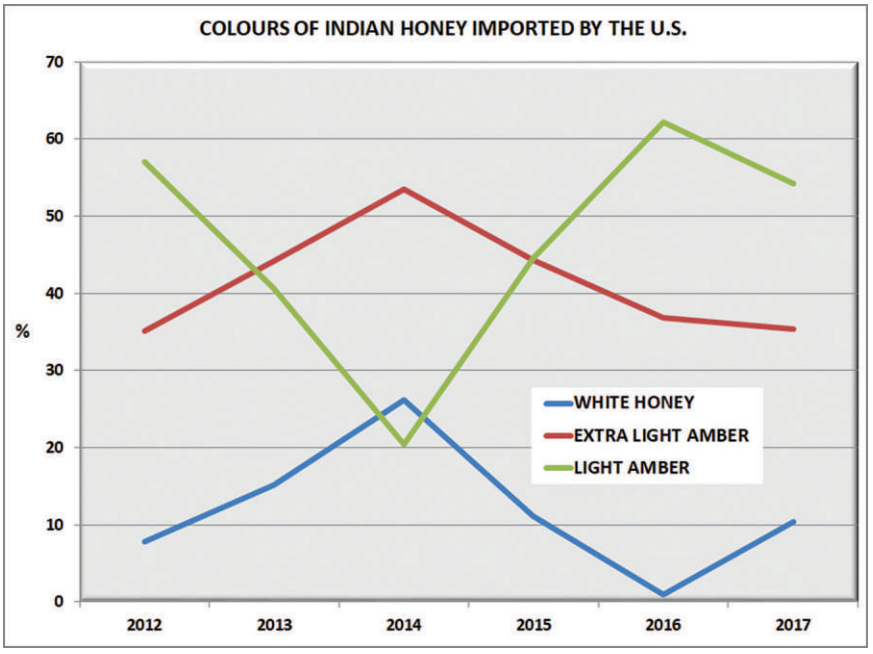

Chart 9: *India's Changing Colors 2012-2017* Prepared by Prof. Garcia (UN Comtrade data)

huge gap has encouraged adulteration of organic honey with conventional honey and has encouraged several other countries to obtain organic certification. As long as that gap remains so high the thrust to enter the organic honey market either fraudulently or authentically will grow. As the prices for conventional honey have remained at depressed levels, it has become clearer that the prevailing wide gap is not sustainable and prices for organic honey have consequently weakened.

Canada

There is carryover from the past crop, when prices were at rock bottom. Some of that inventory was purchased and is being held in warehouses.

India

The first crop of Ajwain is not good and the production is low, which creates fear of a low crop in the future. Demand is strengthening for first quarter shipments.

Ukraine

Beekeepers in Ukraine are waiting for higher prices and hoping for buying interest from Europe as of late October. Europe's import quota for Ukrainian honey has been increased. Last year there was an explosive price increase after January and some hope for a repeat in 2018. Firm prices are anticipated due to small inventories in Ukraine. As of the end of July, U.S. imports from Ukraine exceeded 13,000 metric tons (28,600,000 lbs.).

United States

The US crop at this time is estimated to be less than 2016.

Vietnam

Vietnamese beekeepers are suffering due to low prices. Discussions and exchanges with authorities in the EU are expected to lead to increased exports to the EU. Changes in beekeeping practices to meet standards required by European importers have been requested as a condition for a vigorous export program from Vietnam to the EU. Europe opened its market for Vietnamese honey in March,

2013. The EU-Vietnam Free Trade Agreement should ease Vietnam's honey exports when it becomes fully effective.

It is important to note that Vietnam has many floral sources of honey. As is well known, *Acacia mangium*, the predominant floral source, produces dark honey which is color unstable. At the same time, after the Vietnam war and with the assistance from the World Bank and other international agencies, Vietnam's coffee and cashew industries have experienced tremendous growth. Honey is a byproduct of the coffee and cashew groves. Carbendazim is used to protect the coffee and cashew trees. Coffee and cashew produce light, mild and delicious honeys. The European Union officially permits a level of 1,000 ppb. And therefore will be able to accept the Vietnamese light honeys which will fetch higher prices. This is indirectly important for the American market since those honeys have been used to blend, lighten and create better color stability for Vietnam's *Acacia mangium* and rubber honeys. Since the European market has reduced imports of Chinese honey, as European retailers and packers demand that the honey passes the NMR test, this could divert important quantities and qualities from the American market to the European market.

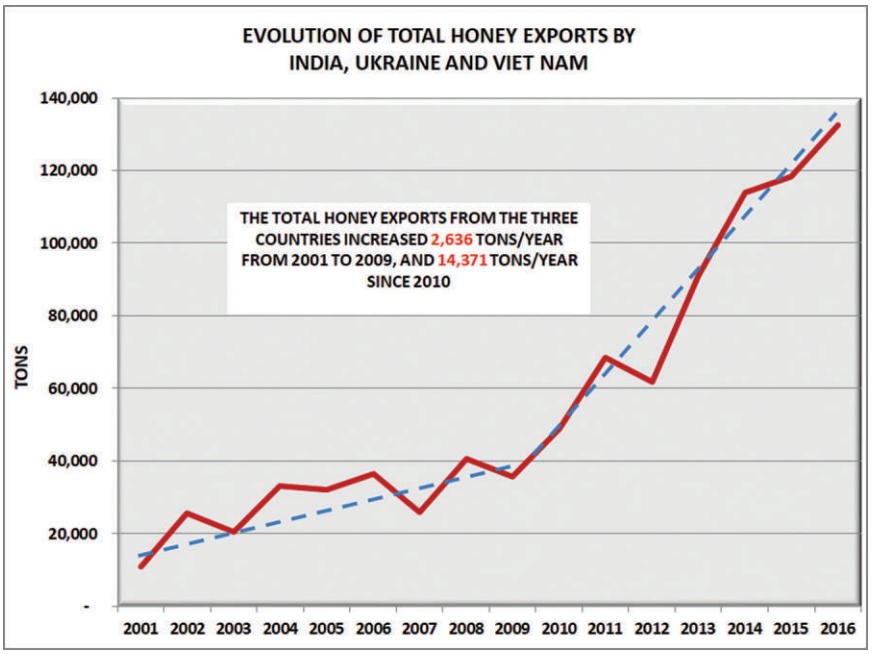

Chart 10: *Increasing Honey Exports by India, Ukraine, and Vietnam.* Prepared by Prof. *Garcia* (UN Comtrade data)

China

China remains the world's largest exporter of honey. As pointed out by Chinese representatives at Apimondia, there are many laws in China against food fraud and adulteration. In fact, experts from the U.S. have been engaged by the Chinese government to help address issues of food safety and food fraud. Just as the horrendous pollution in China has generated great bottom up pressure on the Chinese government to solve problems of pollution, which is leading to premature death, there can be bottom up pressure to ensure food safety and overcome food fraud, which has brought more harm to the Chinese consumers and market than to the consumers in their export market.

A deep concern remains China's policy of outside investment. Those investments have increased dramatically. Some of the "trophy investments" have been criticized for diverting investments from strategic resources, agricultural, minerals, energy, high tech, etc. Goldman Sachs is reported to have made an agreement, announced after the bilateral meetings in Beijing, that China's sovereign wealth fund has authorized investment of many billions of dollars in the U.S.

Earlier this autumn a Chinese company tried to acquire a U.S. major investment fund, which effort was turned down by federal authorities because of concerns that the Chinese were using surrogate equity firms to acquire strategic resources. There is widespread concern that China's quest for international, vertical and horizontal integration is being expressed throughout the world, including the international and American honey industries, through surrogate companies orchestrating the acquisitions and their integration with each other. Such integrated control facilitates fraud, adulteration and private quality standards.

An investigation by the U.S. Justice Department recently revealed that the Chinese government was curtailing "Beijing's approval to chase splashy deals... The investments approved [through direct and surrogate] purchases have largely meshed with China's strategy to court other countries through infrastructure and energy investment. Chinese businesses …are increasingly mixing money with diplomacy as they scour the world to secure valuable natural resources." (NY Times Nov. 22, 2017, "Bribery case sheds light on mysterious Chinese outfit").

Environmental Impacts on Honey Production

As I write this for publication, it is the warmest Thanksgiving in U.S. history. The scientific evidence of increased climatic volatility, severity and intensity of extreme weather events haunts the future. The practical consequences are already felt in the present. The intense hurricanes which visited Texas, Puerto Rico and Florida, the massive forest fires in northern California and Portugal, the heat waves in Italy, Spain and Portugal, have resulted in tremendous human suffering and unprecedented financial loss.

The melting of glaciers and the warming of the seas increase as the permafrost retreats, threatening huge releases of methane gases, which trap heat. Due to increased climate volatility, agricultural production and honey production have

entered periods of unprecedented unpredictability and vulnerability.

The issues of global food security and food fraud have become deeply intertwined. Since many of these processes are self-feeding processes, their reversal presents daunting challenges.

Conclusion

The market, science and social responsibility jointly require the employment of the most advanced scientific methodologies to combat Food Fraud and Honey Adulteration in all its several forms and manifestations. A healthy international and American honey industry requires a balancing of incentives at all levels of an industry including at the level of beekeepers whose expertise and labor generate the natural product marketed and sold by the industry.

The creative marketing of honey and the pursuit of a strategic and positive agenda depends upon both ensuring the elimination of food fraud from the honey market and the articulation of the virtues of this historic product of nature which is so intertwined with the ecological health of the Planet.

Acknowledgements

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Author Bio

Prof. Norberto García teaches Apiculture at the UNIVERSIDAD NACIONAL DEL SUR in Bahía Blanca, Argentina. He is also Senior Consultant of NEXCO S.A., the main Argentine honey exporter. He is the current president of the International Honey Exporters Organization (IHEO) and chairs the Working Group on Adulteration of Bee Products of APIMONDIA, working to create aware¬ness on the problems of honey adulteration worldwide.

Mr. Phipps is President and founder of CPNA International, Ltd. He is a former member of the National Honey Board and Co-Chairman of the Committee for the Promotion of Honey and Health. He was a recipient of a National Science Foundation Fellowship in the Philosophy of Theoretical Physics. In 2017 he was appointed Vice President of the Apimondia Scientific Commission on Beekeeping Economy. He has worked with FDA to develop a research protocol for the global diversity of honey. e-mail: info@cpna-global.com